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IS 2603 (1983): Copper anodes for electroplating [MTD 24: Corrosion Protection]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard
SPECIFICATION FOR
COPPER ANODES FOR ELECTROPLATING
(*First Revision*)

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR COPPER ANODES FOR ELECTROPLATING (First Revision)

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Indian Standard
SPECIFICATION FOR
COPPER ANODES FOR ELECTROPLATING
(*First Revision*)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 15 September 1983, after the draft finalized by the Metallic Finishes Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard has been formulated with a view to laying down requirements for copper anodes used by electroplaters in the country. Since impurities in copper anodes will have deleterious effect on the electroplating process, electrolytic copper has only been recommended for the making of these anodes.

0.3 In the preparation of this standard, due consideration has been paid to the manufacturing and trade practices followed in the country in this field.

0.4 This standard is intended to cover the technical provisions relating to copper anodes for electroplating, and it does not include all the necessary provisions of a contract.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the requirements for copper anodes used in electroplating.

*Rules for rounding off numerical values (revised).

2. CHEMICAL COMPOSITION

2.1 Copper anodes shall be manufactured from electrolytic tough pitch copper (ETP) [*see also* IS : 191 (Part 5)-1980*] with the chemical composition as given in Table 1, when analyzed with IS : 440-1964†.

TABLE 1 CHEMICAL COMPOSITION

Sl No.	ELEMENT	PERCENT
i)	Copper (any silver present to be counted as copper), <i>Min</i>	99.90
ii)	Bismuth, <i>Max</i>	0.001
iii)	Lead, <i>Max</i>	0.005
iv)	Total of all impurities excluding oxygen and silver, <i>Max</i>	0.03

NOTE — For acid copper plating, phosphorus content in copper anode shall be 0.005 percent, maximum.

3. SHAPE AND SIZE

3.1 Copper anodes shall be supplied in either cast, rolled, or extruded form from electrolytic copper or cut to size from electrolytic cathode plates, as specified by the purchaser. Oval shape of anode is considered to be best from the point of view of even flow of current and uniformity of deposition. Dimensions of the anode shall be as agreed to between the manufacturer and the purchaser.

4. FREEDOM FROM DEFECTS

4.1 Anodes shall be clean, substantially free from cracks, warps, inclusions, porosity, ragged edges, surface films, such as rolling skin, and other defects which may adversely affect uniform dissolution while in use.

5. MARKING

5.1 The anodes shall be marked with the name, initials or trade-mark of the manufacturer. In case of anodes with hooks, the name, initials or trade-mark of the manufacturer shall be placed near the hooks.

*Specification for copper: Part 5 Electrolytic tough pitch copper (ETP) (*third revision*).

†Methods of chemical analysis of copper (*revised*).

5.1.1 Copper anodes may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors may be obtained from the Indian Standards Institution.

6. PACKING

6.1 Unless otherwise specified, anodes shall be separated according to their size and shall be packed in such a manner as to ensure safe transportation to the point of delivery. Wherever practicable, one size of anodes shall be packed in a single container.

7. SAMPLING

7.1 Sampling of copper anodes for chemical analysis shall be as agreed to between the manufacturer and the purchaser. A recommended sampling procedure and criterion for conformity are given in Appendix A.

A P P E N D I X A

(Clause 7.1)

SAMPLING PROCEDURE FOR COPPER ANODES FOR ELECTROPLATING

A-1. LOT

A-1.1 In any consignment, all the copper anodes of the same type and manufactured under similar conditions of production shall be grouped together to constitute a lot.

A-2. SCALE OF SAMPLING

A-2.1 The number of anodes to be selected at random from the lot shall depend upon its size and shall be as given below:

<i>No. of Anodes in the Lot</i>	<i>No. of Anodes to be Selected</i>
Up to 25	2
26 to 50	3
51 to 100	4
101 to 200	5
201 to 300	7
301 and above	10

A-3. DRILLINGS

A-3.1 From each of the anodes selected in accordance with **A-2**, drillings shall be obtained from not fewer than three widely-spaced positions. These drillings shall be obtained as specified in **A-3.2** and drillings from each anode shall be stored separately.

A-3.2 Select a sharpened twist drill (6 to 10 mm drill should be suitable). Thoroughly clean the drill in light petroleum and wipe clean with muslin. Free the anode from any loose impurity by means of a steel wire brush. Bore the holes to approximately 10 percent of the thickness of the anode and discard the drillings therefrom. Place the anode on a clean tinned iron sheet and drill a further 80 percent of the thickness. Collect the drillings thus obtained and transfer to a clean container. If a larger quantity of drillings is required, more holes may be drilled as described above. Before analyzing, the drillings should be washed in light petroleum.

A-4. NUMBER OF TESTS

A-4.1 The drillings from each anode selected in **A-2.1** shall be separately tested for requirements mentioned in 2.

A-5. CRITERION FOR CONFORMITY

A-5.1 From the test results, the average and the range shall be calculated for each of the characteristics, and the lot shall be considered as conforming to the requirements of this specification if the conditions mentioned below are satisfied for each characteristic:

- If the maximum limit is specified, then (average + 0.6 range) shall be less than or equal to the limit specified.
- If the minimum limit is specified, then (average - 0.6 range) shall be greater than or equal to the limit specified.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemen	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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